2013-213 NEW SCHIZOSACCHAROMYCES POMBE APLLICATIONS IN WHITE WINEMAKING

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This work studies the physiology of Schizosaccharomyces pombe strain 938 in the production of white wine with high malic acid levels as the sole fermentative yeast, as well as in mixed and sequential fermentations with Saccharomyces cerevisiae Cru Blanc. The induction of controlled maloalcoholic fermentation through the use of Schizosaccharomyces spp. is now being viewed with much interest. The acetic, malic and pyruvic acid concentrations, relative density and pH of the musts were measured over the entire fermentation period. In all fermentations in which Schizo. pombe 938 was involved, nearly all the malic acid was consumed and moderate acetic concentrations produced. The urea content and alcohol level of these wines were notably lower than in those made with Sacch. cerevisiae Cru Blanc alone. The pyruvic acid concentration was significantly higher in Schizo. pombe fermentations. The sensorial properties of the different final wines varied widely.

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2013-215 NEW SCHIZOSACCHAROMYCES APPLICATIONS IN RED WINES ALCOHOLIC FERMENTATION

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The fermentation of grape must using non-Saccharomyces yeasts with particular metabolic and biochemical properties is of growing interest. In the present work, red grape must was fermented using four strains of Schizosaccharomyces pombe (935, 936, 938 and 2139), Saccharomyces cerevisiae 7VA and Saccharomyces uvarum S6U, and comparisons were made over the fermentation period in terms of must sugar (glucose + fructose), malic acid, acetic acid, ammonia, primary amino nitrogen, lactic acid, urea (a
possible fermentation activator or precursor of other metabolites) and pyruvic acid (a molecule affecting vitisin formation and therefore colour stability) concentration. The colour intensity of the fermenting musts was also recorded. The Schizosaccharomyces strains consumed less primary amino nitrogen and produced less urea and more pyruvic acid than other Saccharomyces species. Further, three of the four Schizosaccharomyces strains completed the breakdown of malic acid by day 4 of fermentation. The main negative effect of the use of Schizosaccharomyces was strong acetic acid production. The Schizosaccharomyces strains that produced most pyruvic acid (938 and 936) were associated with better 'wine' colour than the remaining yeasts. The studied Schizosaccharomyces could therefore be of oenological interest.

NUEVAS APLICACIONES DEL GÉNERO SCHIZOSACCHAROMYCES EN LA FERMENTACIÓN DE VINOS TINTOS

Se estudió la fisiología de Schizosaccharomyces pombe en la elaboración de vinos tintos según diferentes modalidades fermentativas. Para el desarrollo de fermentaciones mixtas y secuenciales se empleó también una cepa seleccionada comercial de Saccharomyces cerevisie (AWRI 796, Maurivin, Australia).
Para las fermentaciones con cultivo único se utilizaron Schizosaccharomyces pombe (938) y Sacharomyces cerevisiae (AWRI 796, Maurivin, Australia), que fueron inoculados independientemente y sirvieron para evaluar las diferencias entre ambas especies. En este último ensayo y tras comprobar que los azúcares fueron consumidos en su totalidad, se indujo la fermentación maloláctica utilizando una bacteria láctica comercial (Alpha, Lallemand Danstar Ferment, Canada) Todos los ensayos se realizaron utilizando un mosto fresco sin pasteurizar para reproducir condiciones reales de vinificación. Durante todo el periodo experimental se realizó un seguimiento de los principales parámetros fermentativos, así como otros más específicos y relacionados con la capacidad de consumir ácido málico por parte de Schizosaccharomyces pombe. En todas las fermentaciones en que intervino la cepa 938 el ácido málico fue consumido prácticamente en su totalidad, mostrando niveles moderados de ácido acético. Los contenidos en estos fermentados fueron sensiblemente inferiores a los restantes y con perfiles sensoriales muy diferenciados entre ellos.

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2013-217 D-OPTIMAL DESIGN EFFICIENCY IN BIOLOGICAL PROCESS MODELING: ALCOHOLIC FERMENTATION OF WINE AS CASE STUDY

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The high cost of the experimental analysis has been one of the major barriers in the expansion of knowledge in the area of problematic fermentations. Nevertheless, computational experiments designs have been developed extensively, being the design of experiments D-Optimal very attractive to study for example growth parameters of alcoholic wine fermentation.
The D-optimal design is more efficient than traditional designs used in modeling of microbial growth, which would reduce the number of tests required for the determination of the parameters of microbial growth at laboratory and industrial scale.
In this study, we analyze two types of models used for different purposes in the modeling of microbial growth, the first empirical: the surface response model, and the second theoretical: the Gompertz model. The goodness of regression fit was evaluated using the sum of squares of residuals vs. experimental data. The response surface model compared the D-Optimal design with the Central Composite design. This last was centered in three levels (low, medium and high) and three factors (temperature, initial sugar concentration and available nitrogen) each other, giving a total of 15 fermentations for each design. In addition, the theoretical model is evaluated with 4 samples according the experimental design from a universe of 28.
The use of D-Optimal design generated an improvement in the predictions of the biomass behavior under the same conditions, thus it makes a more efficient use of the invested resources in the exploration and parameter determination of the microbial growth in wine alcoholic fermentation.
All the previous allows estimating the growth parameters with fewer experimental points, thus reducing the cost of the experimentation phase in the research.